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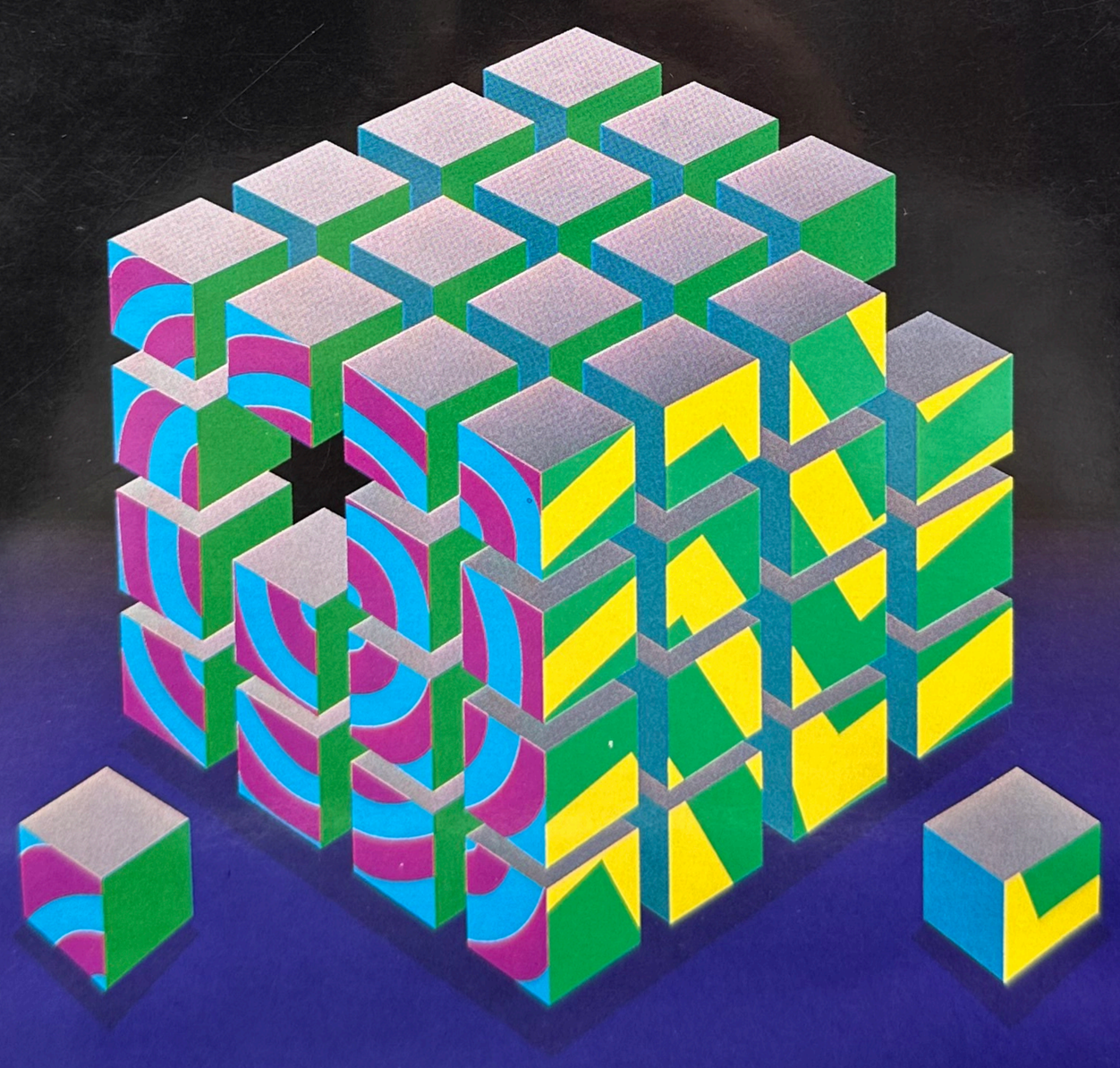

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Strategies for Problem Solving

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STRATEGIES FOR PROBLEM SOLVING

This is one of a series of three problem-solving packages designed to motivate students and build their skills in using problem-solving strategies. Each package has two learning modes. Lesson disks provide tutorial instruction and guided practice in using specific problem-solving strategies. Microworld disks provide larger environments where students can explore problems using strategies of their own choosing.

Contents of this Package

1 Lesson disk
1 backup Lesson disk
1 Microworld disk
1 backup Microworld disk
1 Courseware Guide

Packages in the series include:

Grades 3–4	**Strategies for Problem Solving I**	**02 17C 01**
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This is one of a series of three problem-solving packages designed to enhance students' and build their skills in using problem-solving strategies. Each has two learning modes. Lesson tasks provide instruction and practice in using specific problem-solving strategies. Application tasks provide larger environments where students can explore problem situations of their own choosing.

Contents of this package

1 Lesson disk
1 Application disk
1 Teacher's Guide
1 Classroom Guide

Grades 2–3
Grades 4–5

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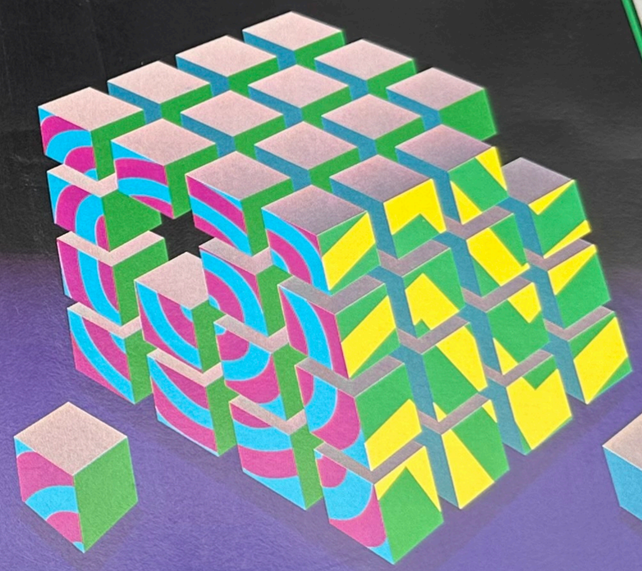

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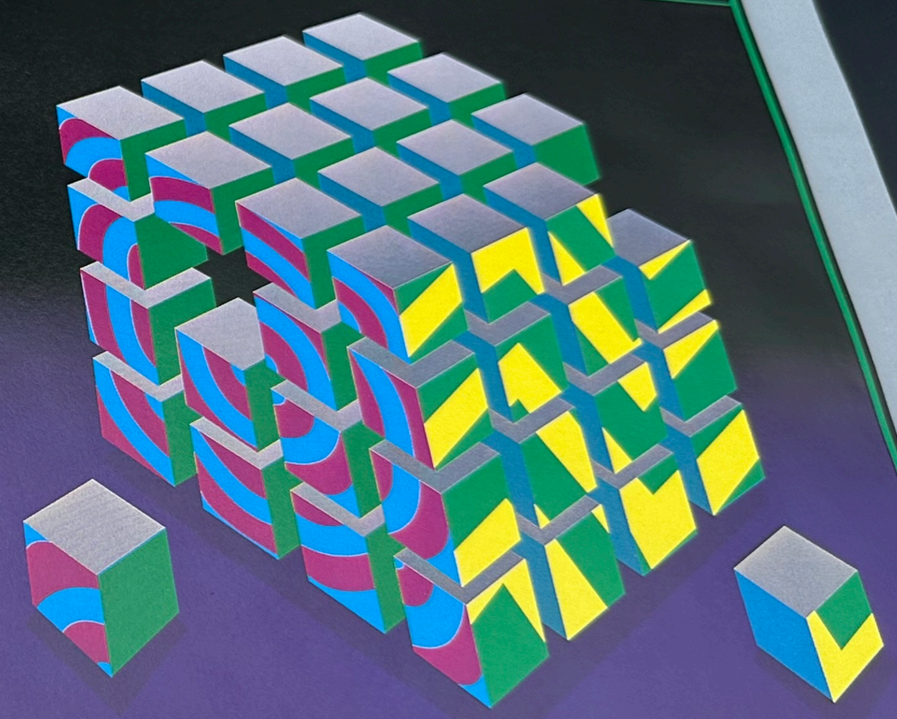

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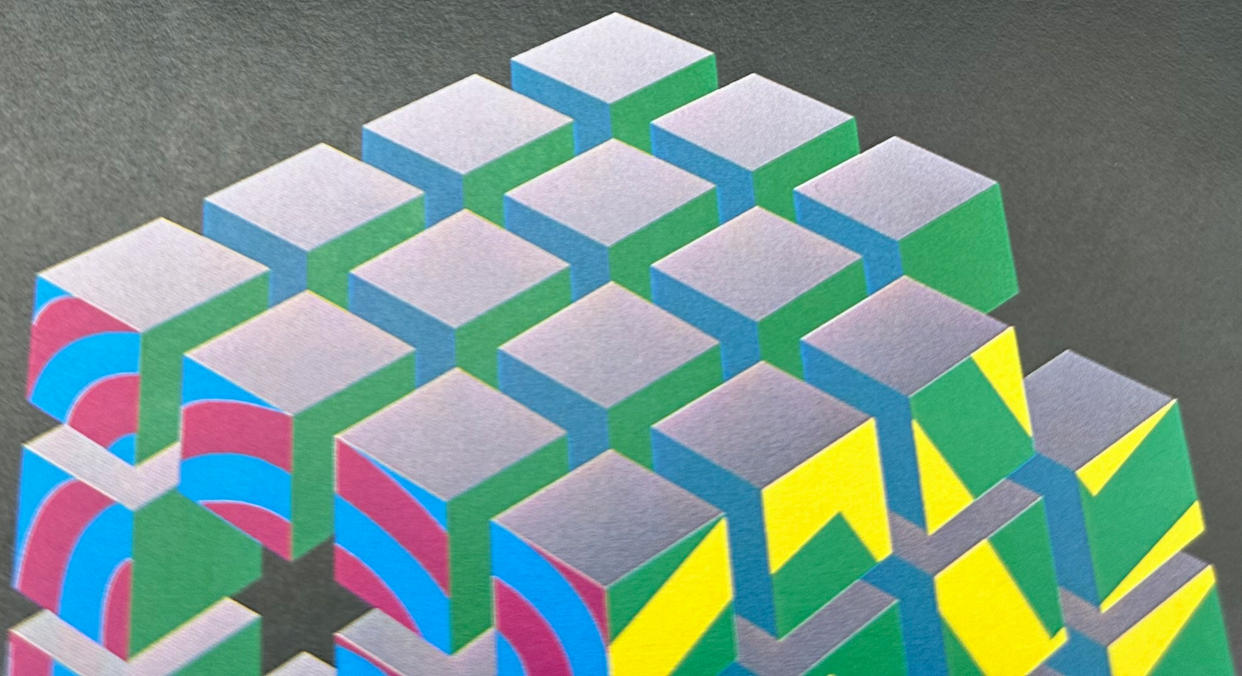


SPIROLATERALS

This microworld has three different activities, all of which involve computer graphics: (1) Create Your Own Spirolaterals, (2) Challenge Match, and (3) Picture Gallery. The first two activities review and reinforce the eight problem-solving strategies presented in the lessons.

From the Main Menu for Spirolaterals, students can access an introduction to the microworld, each of the three activities, and instructions for initializing a data disk. A data disk is used to save student spirolaterals designed in the Create Your Own Spirolaterals activity, and should be prepared before students begin the activity. Spirolaterals stored on the data disk are used in the Challenge Match activity (Data-Disk Challenge Match) and in the Picture Gallery activity.

Initializing a Data Disk

If students wish to save the spirolaterals they create, they will need to initialize a blank disk at the start of the program. Disks may be initialized by choosing Initialize a Data Disk from the Spirolaterals Main Menu. This option will bring them to the Initialize a Data Disk screen. If students are using one drive, they should type a 1 and then press RETURN. If students are using 2 drives, they should type a 2 and then press RETURN. (The disk controller card must be in slot # 6.)

RETURN will display instructions to place the blank disk students want to initialize in Drive 1 (or the drive designated on the previous screen). RETURN is pressed to start the initializing process. If students decide not to initializing this time, ESC can be pressed to quit and go back to the Spirolaterals Main Menu.

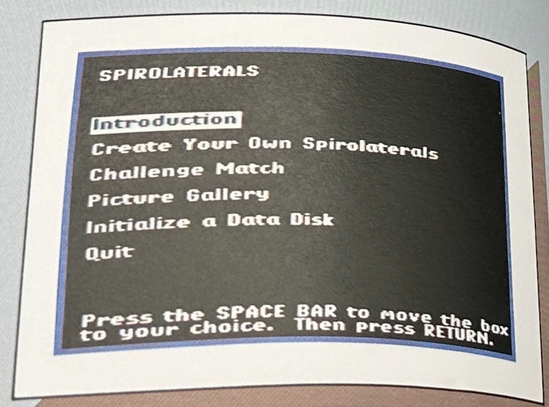
Spirolaterals opening screen

Create Your Own Spirolaterals

In this activity, students create designs, called spirolaterals, on a graphics screen. Students also may edit the spirolaterals, color them (if using a color monitor), and save them on an initialized data disk. The drawing device is an arrow that draws lines in units of length and makes turns in degrees, based on input numbers.

INPUT FIELDS

Students enter input numbers into three fields that appear at the bottom of the graphics screen: SIDES, ANGLE, and REPEATS. In the SIDES field, each input number represents the length in units of each side. Up to one line of input numbers may be entered in the SIDES field. A space must be entered between each input number.

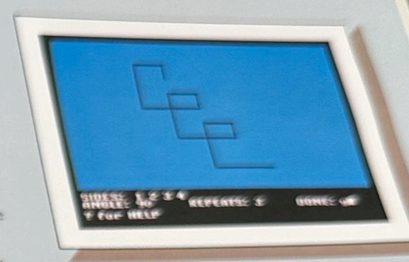


Spirolaterals menu

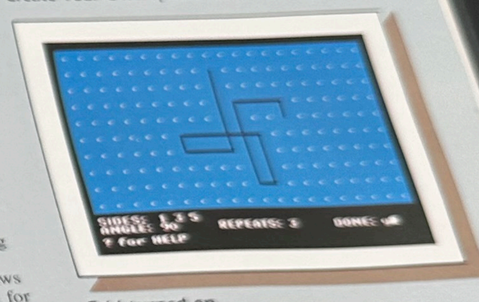
In the ANGLE field a positive input number represents the degrees the arrow revolves counterclockwise between sides of the spirolateral. Only one input number can be entered in the ANGLE field.

In the REPEATS field, the input number represents how many times the specified sides and angle should be drawn.

A cursor designates entry of input numbers, field by field. The cursor always begins in the SIDES field. Students enter an input number or numbers and press RETURN. The cursor then moves to the next field. The cursor does not move to the next field unless an input number has been entered in the previous field and RETURN has been pressed. To erase entries within a field, students use the left arrow key. (The DELETE key also erases entries on the Apple //e and //c.)



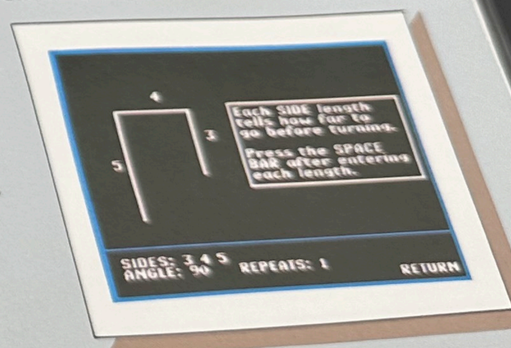
Create Your Own Spirolateral



Grid turned on

HELP

Students needing assistance while creating a spirolateral can access a HELP screen by pressing the ? key. The HELP screen menu offers five options. If option 1 is selected, the program draws a model spirolateral and displays the field input for that spirolateral. Instructions are given on how to enter data in each field. The choice of option 2 accesses a screen displaying the field input data for the last five spirolaterals that students have created in the current session. Selection of option 3 gives students access to a grid screen composed of dots that correspond to the units of length for side measures. The grid is superimposed over the spirolateral being created, thus enabling students to determine side lengths. The grid stays on until it is turned off by the selection of option 4 from the HELP menu. The choice of option 5, DONE, returns the original program graphics screen.



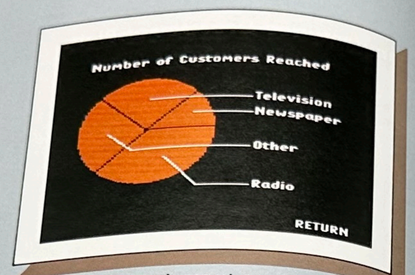
HELP for side length

Advertising Department Plan

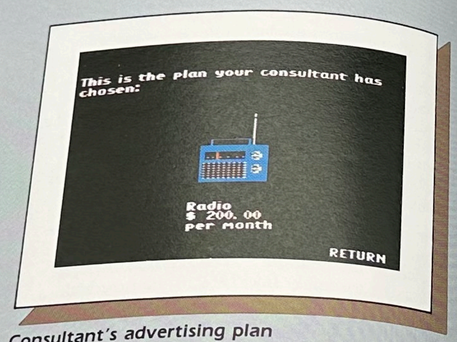
Advertising department managers decide whether to create their own advertising plan or to hire a consultant for $2,000. If the first option is selected, managers may begin by reading the advertising research report. The report presents circle, bar, and broken-line graphs illustrating (1) the number of customers reached by radio, TV, and newspaper, (2) the advertising cost per month reached via the three media, and (3) the total sales attributed to advertising via the three media. To create their advertising plan, managers use information obtained from the report as well as a table listing cost per month of advertising for radio, TV, and newspapers. The completed plan presents the advertising cost per month, based on the medium selected.

If the consultant option is chosen, the consultant's advertising plan is presented. The method of advertising selected by the consultant is TV or radio 75% of the time and newspaper 25% of the time. After reviewing the cost of the consultant's plan, managers may choose to (1) accept the plan, (2) reject the plan and create their own, or (3) read the advertising research report before making any decision. The consultant's fee of $2,000 is deducted from the cash on hand. If the consultant's plan is rejected, managers create a plan following the procedures described previously. If reading the research report is specified, managers study the report before deciding whether to accept or reject the consultant's plan.

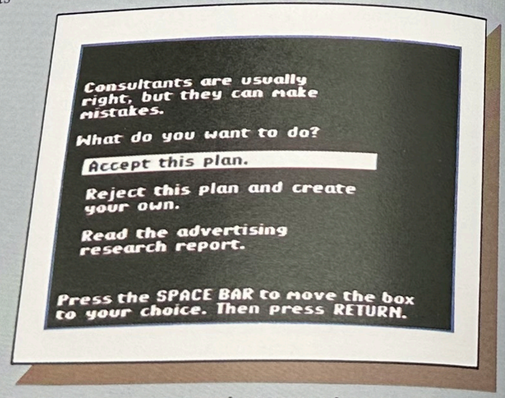
When a participant is not managing the advertising department, the default plan and its associated costs are presented in the business plan summary. The advertising method selected by default is in the upper 25% of the cost scale.



Advertising research report graph



Consultant's advertising plan


Consultants are usually right, but they can make mistakes.
What do you want to do?
Accept this plan.
Reject this plan and create your own.
Read the advertising research report.
Press the SPACE BAR to move the box to your choice. Then press RETURN.

Option to accept or reject consultant's plan

Production Level and Selling Price

When the three department plans are complete, participants view a summary of the plans. Next, the general manager uses the What-If Machine to set the production level and selling price.

The What-If monitor displays an equation for determining the profit: Selling Price − Cost Per T-shirt = Profit Per T-shirt. The general manager enters the missing amount for the selling price per T-shirt. The What-If Machine automatically subtracts the cost per T-shirt from the selling price per T-shirt to calculate the profit per T-shirt.

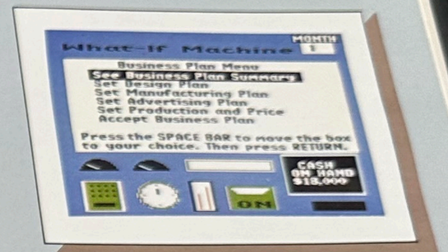
Next, an equation for predicting the total monthly inventory is displayed on the monitor of the What-If Machine: Production Level + Existing Inventory = Inventory.
The general manager enters the missing addend for monthly production level, a figure that should not exceed the maximum monthly production level for the manufacturing method selected. The amount of T-shirts in inventory each month may not exceed 6,000.

The What-If monitor next displays four equations:

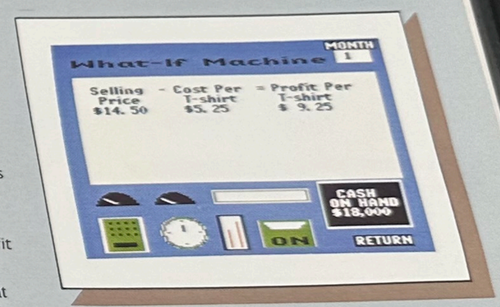
Cost Per T-shirt × Production Level = Total T-shirt Costs
Total T-shirt Cost + Start-up Costs + Advertising Costs = Total Expenses
Selling Price × Inventory = Predicted Income
Predicted Income − Total Expenses = Predicted Profit

The general manager may elect to change the selling price per T-shirt or one or more department costs not represented by default values in an effort to increase the profit. When the new amounts are inserted in the equation, the What-If Machine recalculates the new profit.

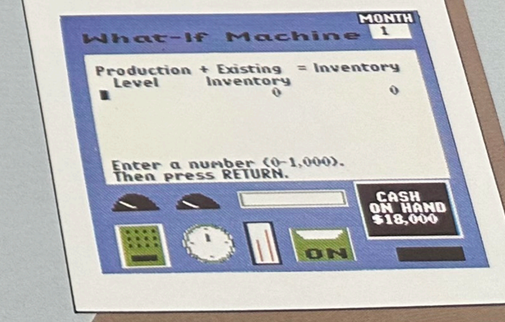
If the predicted profit is unsatisfactory, the general manager may again access the department plan screens to change any costs not obtained by default.



Business plan menu



Equation for determining profit



Equation for determining inventory

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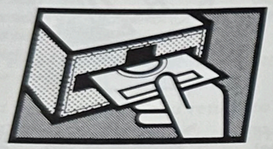
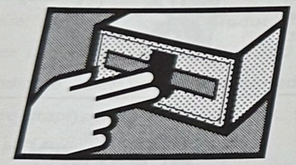
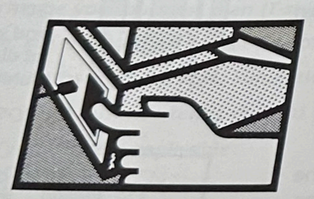
Turn on monitor.



Insert disk into disk drive, label side up.



Close disk drive door.



Turn on computer.

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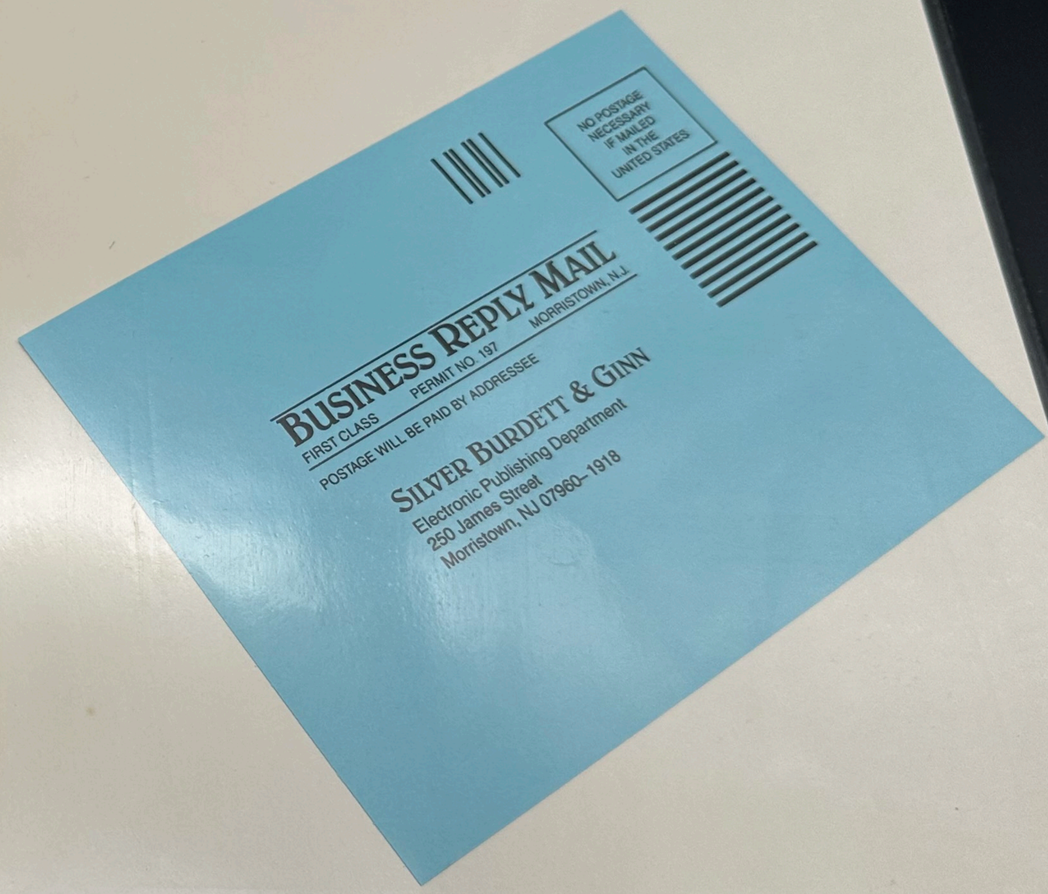
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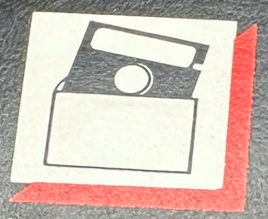

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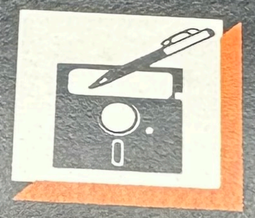

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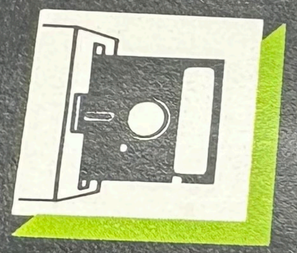
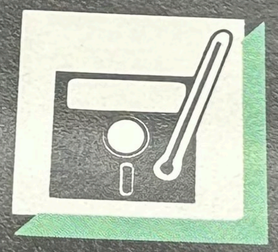
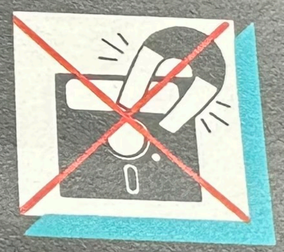


Insert disk carefully into disk drive.



Protect disk from extreme heat or cold.



Keep disk away from magnetic fields.

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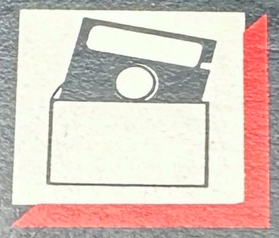

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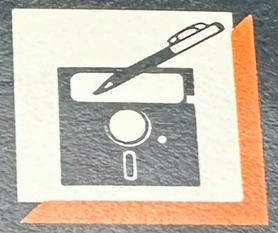

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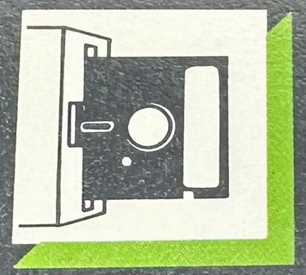

Insert disk carefully into disk drive.

Protect disk from extreme heat or cold.

Keep disk away from magnetic fields.

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Strategies for Problem Solving II

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Apple®II Plus (64K), Apple®//e, and Apple®//c

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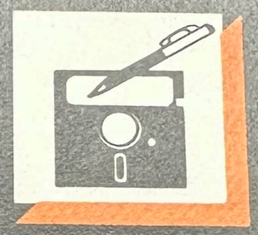

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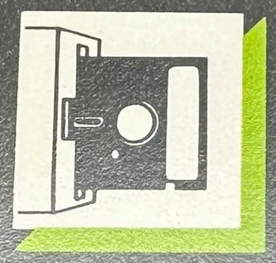

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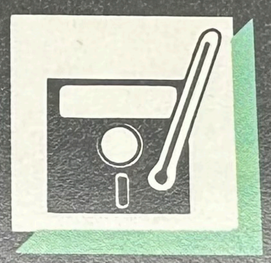

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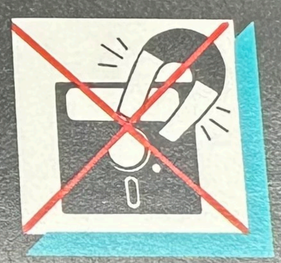

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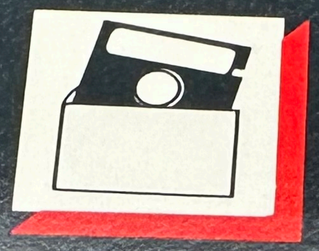

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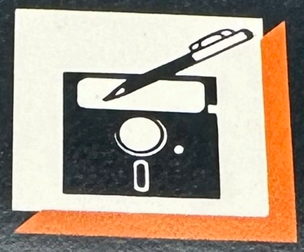

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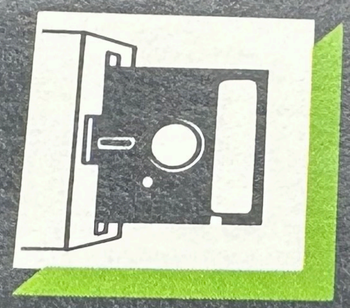

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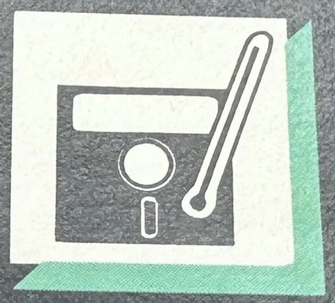

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